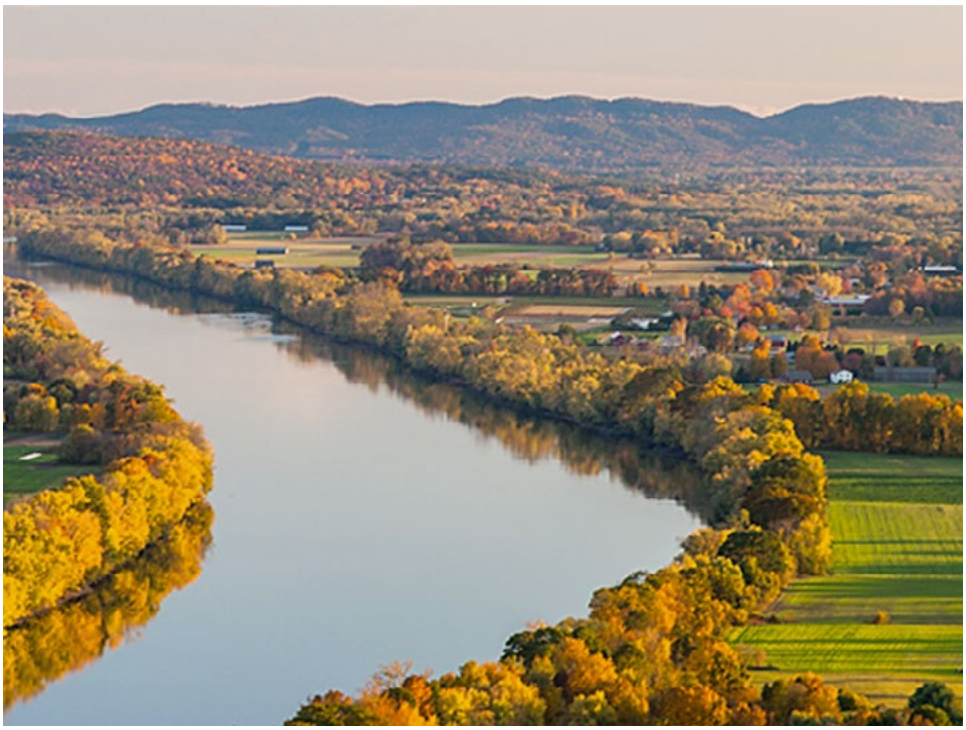


USFWS

Connecticut River from Mount Sugarloaf overlook

Connecticut River Main Stem and Major Tributaries

- **Overview Quonatuck Conservation Focus Area (Proposed)**

Overview
Quonatuck Conservation Focus Area (Proposed)

Along the main stem of the Connecticut River and thirteen major tributaries in Vermont, New Hampshire, Connecticut, and Massachusetts

Conservation Focus Area (CFA) — Acreage Profile	Acres
Total Acres in CFA*	8,000

*These 8,000 acres are not tied to any specific parcels. The Service does not plan to acquire existing conserved lands along the Connecticut River main stem or its tributaries and will only acquire lands from willing sellers. Existing refuge units along the main stem or noted tributaries would be assigned as part of the Quonatuck Division, assuming this plan's approval.

What other special considerations were made in delineating the boundaries of the proposed CFA?

The Quonatuck CFA is conceived as 8,000 acres of priority habitat along the main stem of the Connecticut River and major tributaries (see map A.2 below). The CFA's boundary approximates the 100-year floodplain, as defined by the Federal Emergency Management Agency (FEMA; *http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping#2;* accessed August 2016), for the main stem and major tributaries. The map is an approximation of the tributaries that would be considered. The 8,000 acres targeted for this CFA is in addition to the acreage identified for several other CFAs that occur within the 100-year floodplain of the Connecticut River and its tributaries.

The Quonatuck CFA represents approximately 1,500 acres of tidal marsh and floodplain habitat along the mouth and lower extremities of the river in Connecticut, approximately 1,500 acres of floodplain forest along the river and major tributaries in Massachusetts, and approximately 5,000 acres of floodplain forest along the upper portion of the river and major tributaries and distributed evenly between New Hampshire and Vermont.

Our priority would be conserving floodplain forests and wetlands, as well as tidal (salt, brackish, and freshwater) wetlands, and any occupied or potential habitat for federally listed or candidate species. We would seek to protect all of these habitats were they currently occur, where they can be restored, and/or where they are projected to migrate to in the future due to climate change. We would particularly focus on conserving ownerships that include river frontage.

What are the priority habitat types within the proposed CFA?

The priority habitats within the Quonatuck CFA are tidal (salt, brackish, and freshwater) wetlands, floodplain forests, riparian areas, and any occupied or potential habitat for federally listed or candidate species along the main stem of the Connecticut River and its major tributaries.

What are the resources of conservation concern for the proposed CFA?

1. **Federally Listed Threatened and Endangered Species**
   At least fifteen federally threatened and endangered species, including those that have been petitioned for listing, occur in the Quonatuck CFA. These include northern long-eared bat, tricolored bat, roseate tern, northeastern bulrush, Canada lynx, small whorled pogonia, shortnose sturgeon, dwarf wedgemussel, Atlantic sturgeon, Puritan tiger beetle, Jesup's milk-vetch, piping plover, Indiana bat, yellow banded bumble bee, monarch butterfly, regal fritillary, wood turtle and red knot.

   This CFA will contribute to the conservation of the federally endangered dwarf wedgemussel. Very little is known about the habitat requirements of dwarf wedgemussel, whose stronghold is the Connecticut

River, although early investigations hypothesized it requires stable bank conditions and high water quality (U.S. Fish and Wildlife Service 1993, Nedeau et al. 2000). This mussel is threatened by habitat loss, fragmentation and altered river processes (Nedeau 2009).

Shortnose sturgeon and Atlantic sturgeon use habitats in the lower portion of the Connecticut River. Sections of the main stem in Massachusetts are important migrating habitat for shortnose sturgeon, while certain sections in Connecticut are critical spawning and overwintering habitat for this species. Juvenile Atlantic sturgeon were recently documented in the lower portion of the Connecticut River (S. Gephard, CTDEEP, personal communication 2015). This Federal endangered species and a species of greatest conservation need in Connecticut, were once considered extirpated in the Connecticut River, as reproduction no longer occurred in the main stem (Sprankle personal communication 2014). The documentation of juveniles provides a higher probability that there are opportunities to recover this species in the Connecticut River.

The remaining listed species occur in habitats directly adjacent to the river and its tributaries. The federally threatened Puritan tiger beetle occur in two populations along the Connecticut River—one in Massachusetts owned by the City of Northampton and Massachusetts Division of Fisheries and Wildlife and another partially occurring on the refuge's Dead Man's Swamp Unit in Connecticut. The Recovery Plan for this species was issued in 1993 (USFWS 1993b). The recovery plan called for a minimum of three metapopulations established or maintained along the species historic range along the Connecticut River. The 2007 5-year review recommended that a high priority be given to identifying private landowners that would be willing to enter into conservation easements for the protection and management of Connecticut River shoreline habitat supporting beetles (USFWS 2007).

The only three known populations of the endangered plant Jesup's milk-vetch occur along the main stem in New Hampshire and Vermont, all in the Quonatuck CFA. These plants rely on the riverside rock outcrops and ledges of the Connecticut River. The Recovery Plan for this species was issued in 1989 (USFWS 1989b). The protection of the populations was a high priority in the recovery plan. The 5-year review in 2008 stated that the plant continued to experience a high degree of threat and that the three populations along the Connecticut River should be permanently protected by acquisition/conservation easements or through long-term management agreements. The 2009 spotlight action plan specifically highlights land acquisition by the refuge as part of the Service's role and responsibility in the species' protection and recovery (USFWS 2009).

The northeastern bulrush occurs within various wetlands in the CFA. This species has adapted to seasonal water fluctuations. Habitat alterations that change the hydrology of a wetland to be consistently wet or dry may have negative consequences for this species. Biologists are currently monitoring known populations, but more information is needed on the habitat requirements, reproductive strategy, and genetic variability (USFWS 2006).

Small-whorled pogonia occurs in very few locations in the watershed. This plant inhabits upland sites in maturing stands of deciduous or mixed deciduous and coniferous forests with sparseto-moderate ground cover (due to nutrient poor soils), a relatively open understory, and proximity to persistent openings in the forest canopy, such as logging roads and streams. Permanent protection through land acquisition and conservation easements, consistent monitoring of known populations and a better understanding of habitat management techniques required to maintain viable populations are some of the criteria needed to delist the species (USFWS 2008).

Canada lynx, a federally threatened species, have been documented within the spruce-fir forests of northeastern Vermont and New Hampshire. Lynx were confirmed breeding within the Nulhegan Basin CFA in the winters of 2012 and 2013. Conservation efforts for this species will be done at the landscape scale, since no single landowner is likely to support enough habitat for this species. Additional information is necessary to evaluate the importance of the Connecticut River watershed for Canada lynx and to determine what measures are needed to ensure their persistence within northern Vermont and New Hampshire. We will continue to monitor Canada lynx populations in the Nulhegan Basin CFA, and work with partners to develop a regional lynx management plan.

This CFA is within the range of the northern long-eared bat and tri-colored bat. During summer nights, these bats forage on insects within wetlands and forested habitats, and roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day. These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

The grassland habitat within this CFA is important for pollinators, such as the yellow banded bumble bee, regal fritillary and monarch butterfly. These species, as well as many other pollinator populations, have been declining due to habitat loss, pesticide use, competition with non-native species and disease. The yellow banded bumble bee, fritillary and monarch butterfly have experienced drastic declines, and the Service has been petitioned to list them under the Endangered Species Act.

Wood turtle, a species under review for federal listing, may occur in this CFA. This species uses aquatic and adjacent terrestrial habitats throughout the year. Wood turtles are thought to be experiencing population declines exceeding 50% over the past 100 years. Populations live primarily in and around river habitats which are often heavily impacted by human development. Habitat degradation, fragmentation and destruction are the main causes for population declines (van Dijk and Harding, J. 2016).

Also, the federally threatened piping plover nests along a 1-mile sand spit owned by The Nature Conservancy at the mouth of the Connecticut River. Red knot and roseate terns are known to use habitat at the mouth of the Connecticut River for stop-over habitat.

2. **Migratory Birds**

The floodplain forest, fresh and tidal wetlands, and riparian habitats along the main stem of the Connecticut River are especially important to migrating birds, such as waterfowl, rails, raptors, and songbirds (Dreyer and Caplis 2001). Species that use these habitats include American black duck, American bittern, snowy egrets, marsh wrens, willow flycatchers and semipalmated sandpiper.

This CFA will also provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

A study of spring stopover habitat use by Neotropical migrant birds within the Connecticut River Valley (*http://www.science.smith.edu/stopoverbirds/index.html;* accessed March 2015) conducted by Smith College through funding by the Service provides indications of the importance of the Connecticut River watershed to migrating birds. During a 3-year study (1996 to 1998), observers conducted 8,640 point count surveys and counted a total of 102,259 birds. The results demonstrated that spring migrant birds using the Eastern Flyway reach the southern portions of the Connecticut River watershed in large numbers, then disperse throughout the watershed and beyond as they continue north. Almost half (47 percent) of the birds counted within the defined count circles were at sites along the main stem of the Connecticut River. This trend was even more pronounced along the Connecticut and Massachusetts portions of the river and during the early periods of spring migration. Forested wetlands and shrub swamps are likely to be particularly valuable habitats along the main stem of the river because they provide more food and protection earlier in the spring migratory period due to warmer air and water temperatures and earlier tree leaf-out. Overall density of birds observed decreased by about half from south to north, as birds dispersed away from the main stem of the river as they moved north. The mouth and lower main stem of the Connecticut River may serve as a landscape feature used by many Eastern Flyway migrants to orient north after reaching the southern New England coast. The results of this study suggest that habitat protection within the Connecticut River watershed will have significant benefits for supporting neotropical migrants during the spring migratory period, especially forest and shrub wetlands along the southern third of the main stem.

3. **Waterfowl**
   The lower Connecticut River has abundant waterfowl year-round and has some of the highest and most significant concentrations of black duck in the Northeastern United States (Dreyer and Caplis 2001). The freshwater and tidal wetlands along the Connecticut River, particularly in the lower portion of the watershed, provide important stopover habitat during both spring and fall migrations for waterfowl, such as American black duck. The habitats most important to black duck are the tidal wetlands along the main stem, as well as the tidal wetlands and bays along the coast. In the winter, the river provides relatively ice-free open water habitat providing access to submerged aquatic vegetation, invertebrates and high-calorie wetland vegetation. Many waterfowl also nest along the river, including mallards, black duck, Canada goose, green-winged teal, and gadwall.

   Further north in the watershed, many migrating ducks use flooded agricultural fields, floodplains, emergent wetlands, shrub swamps, and backwater areas along the Connecticut River for stopover habitat. In fact, the Connecticut River is a waterfowl focus area under the Atlantic Coast Joint Venture for New Hampshire and Vermont, highlighting the importance of the river habitats to breeding and migrating waterfowl (ACJV 2005, NHFG 2006). Species such as Canada geese, teals, mergansers, American black ducks, mallards, wood duck, and some sea ducks use the river corridor during spring and fall migration. The river provides prime breeding habitat for American black duck, wood duck, mallard, common merganser, and Canada geese. Other species nest along the river, but are less common.

4. **Diadromous fish and other aquatic species**
   In addition to the aquatic species mentioned above under "Federal Threatened and Endangered Species," the Connecticut River is home to a variety of anadromous fish and other aquatic species including alewife, blueback herring, Atlantic salmon, American eel, sea lamprey, and American shad. Brook trout are also present, but use cold water tributaries and are more common in the northern portion of the watershed. This high number of priority aquatic species is an indication of the diversity of habitats provided by the Connecticut River and its extensive tributaries. One of the major threats to these species is the large number of dams along the Connecticut River and its tributaries, which are obstacles to migratory fish and other aquatic species passage.

5. **Wetlands**
   There is a large diversity of important wetlands along the Connecticut River main stem and its tributaries. These include floodplain and riparian forests that improve water quality for plants, fish, wildlife, and a very large urban and suburban human population. These riparian wetlands are also important for absorbing impacts from more frequent storm events where coastal and inland flooding can negatively impact habitats and human infrastructure. The protection and restoration of these habitats is critical to becoming more resilient to climate change.

   Other wetlands of significance include the tidal wetlands complex in southern Connecticut which was designated "Wetland of International Importance" by the Ramsar Convention. The Ramsar designation is used for wetland complexes that have international significance in terms of ecology, botany, zoology, limnology, or hydrology. The Connecticut River designated area contains 20,570 acres and consists of 20 discreet major wetland complexes. The lower tidal wetlands complex is considered the best example of this type anywhere in the Northeastern United States and is the most pristine large river marsh system in the Northeast.

What habitat management activities would likely be a priority on refuge lands within the proposed CFA?

Our major habitat management would be habitat restoration and conservation, particularly restoring and maintaining floodplain forest, tidal wetlands, and forested buffers along the river and its tributaries.

What public use opportunities would likely be a priority on refuge lands within the proposed CFA?

We would seek to provide recreational access to the river for priority public uses (hunting, fishing, wildlife observation and photography, interpretation, and environmental education) consistent with the applicable final compatibility determinations.

Does the proposed CFA have special ecological, cultural, or recreational features or designations of regional, State, or local importance?

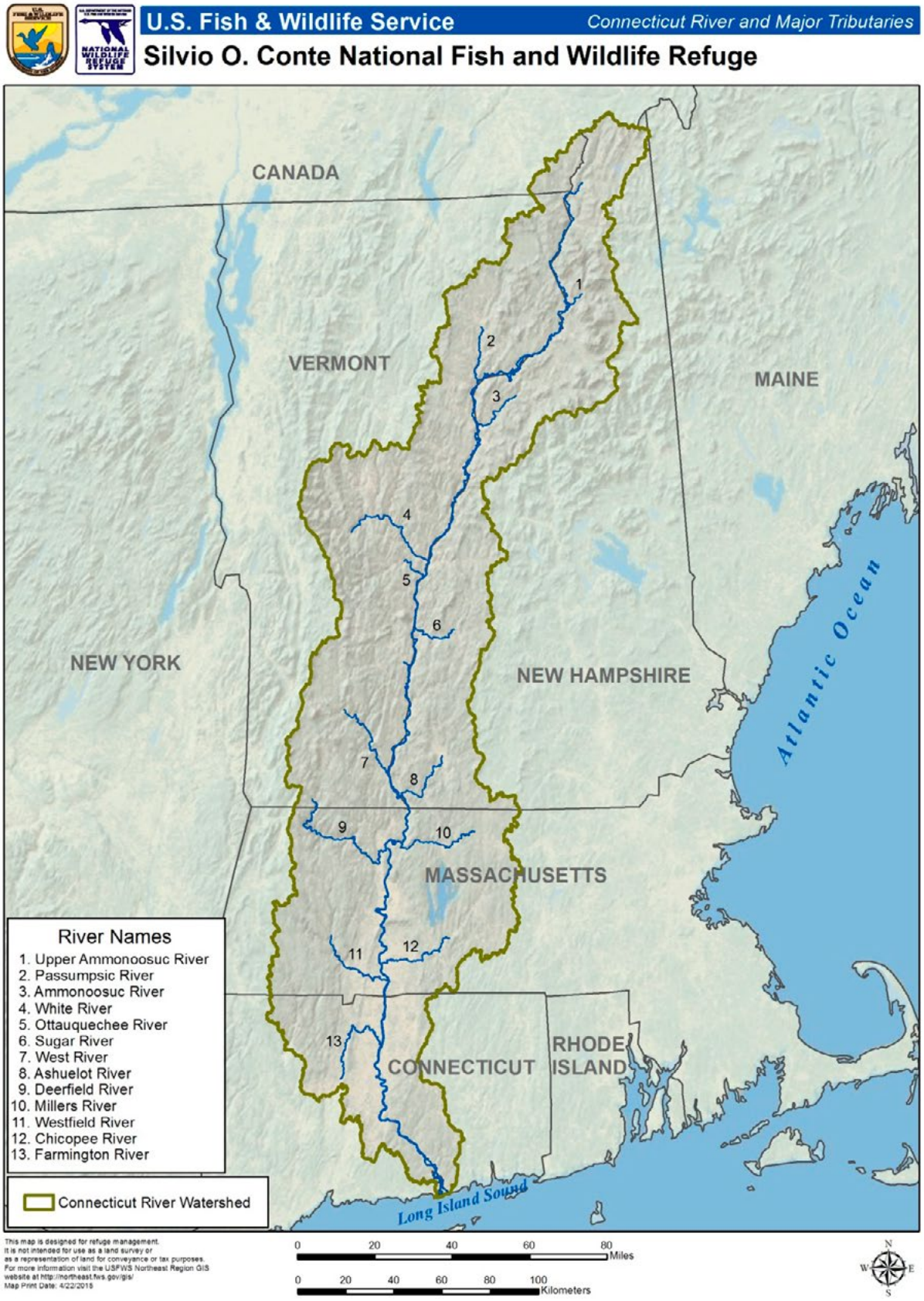
In addition to the Ramsar designation mentioned above, the Connecticut River is designated as National Blueway and an American Heritage River. There are also at least five Important Bird Areas (IBAs) in the Connecticut River watershed: Lower Connecticut River Valley IBA, Station 43 IBA, Herrick's Cove IBA, Barton's Cove—Poet's Seat IBA, and Longmeadow Flats IBA.

How would increased land protection within this CFA help the Service and other conservation landowners adapt and respond to climate change? For example, do these lands significantly contribute to representation, resiliency, and connectivity across the watershed?

The Connecticut River is a free-flowing river for its entire extent in the State of Connecticut. The first dam on the main stem is located in Holyoke, Massachusetts. Its head of tide, the point within the river system where the daily flushing of the tides does not affect the level, is located near Hartford, Connecticut. The barrier-free segment of the river in the State of Connecticut creates opportunities for the emigration of the coastal wetland complex from the Long Island Sound. This CFA is strategically placed to allow that migration to occur. Tidal salt, brackish, and freshwater wetlands along with other floodplain wetlands and forests will be a priority for protection within this CFA. As the sea level changes, the tidally influenced coastal wetland complex will have room to move inland, given suitable soils slopes and other factors.

A major goal is to work with the rest of the conservation community to promote, maintain, and/or enhance both terrestrial and aquatic ecosystems connectivity. Critical connections exist not only between aquatic systems, but also between the Connecticut River uplands, lowlands and floodplain. This CFA facilitates that connectivity and provides more flexibility to adapt to land use and climate change. Strategically protecting land within this CFA could promote near- and long-term opportunities for adaptation, such as corridors for species' migration.

Map A.2. *The Quonatuck CFA (100-year Floodplain)*



Goals, Objectives, and Strategies for Refuge Lands in the Quonatuck CFA under Alternative C

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide stopover habitat for migrating landbirds, potential connectivity corridors for Canada lynx, roosting habitat for bat species, early successional habitat for New England cottontail and mature stands with appropriate microhabitat for small whorled pogonia.

Rationale:
We envision healthy forests within the Quonatuck CFA where a diverse seral structure provides suitable habitat conditions for a suite of wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010). This sub-objective assumes the forests of the Quonatuck are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Foster et al. 1998; Foster 2000; Goodburn and Lorimer 1998; Cogbill 2002; Bellemare et al. 2002; Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and where appropriate, move succession forward to emulate later seral stage characteristics.

For many species, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Quonatuck will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. The USFWS New England cottontail initiative has identified focus areas along the lower Connecticut River, where the decline in early successional habitats is a particular problem for the New England cottontail. New England cottontail is a species of greatest conservation need in Connecticut and Massachusetts.

The conceptual model for the conservation of New England cottontail is for a focus area to contain at least 1,000 acres of early successional habitat of fifteen or more habitat patches, several of which are 25 acres or more. Each habitat patch being one mile or less from each other to aid in New England cottontail movement between patches (Fuller et al 2012). Early successional management within the Quonatuck CFA will occur adjacent to existing acceptable habitat patches to benefit New England cottontail.

Migrating landbirds are typically unable to deposit sufficient fat stores to fly nonstop between breeding and nonbreeding areas (Blem 1980) and must use stopover habitats for feeding and resting before continuing migration. Studies have shown migrating birds exhibit selective use of some habitats over others (Petit 2000; Moore et al. 1990; Rodewald et al. 2004). In general, taller, more structurally diverse vegetation types within an area appear to support greater numbers of migrating birds than do habitats of lower stature and complexity (Noss 1991; Moore et al. 1990). Clearly, structurally complex habitats will not be suitable for all migratory species, but our conservation goal is to provide those areas used most frequently by migrating birds, suggesting relatively

tall, structurally diverse habitats may best serve this purpose. The plasticity in habitat use exhibited by most species during migration (Moore et al. 1990; Petit 2000) suggests that many species are able to effectively use the food resources and cover afforded by structurally complex habitats. Our management goals for hardwood forests in this division would be to provide a diversity of age classes supporting a variety of bird species with a range of foraging opportunities. Patches of mature edge-dominated and shrub-sapling stage forests were used most frequently by fall stopover migrants in a Pennsylvania study (Rodewald et al 2004).

In a mature forest, many migrating bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. In order to support the foraging needs of the greatest diversity of bird species, hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral shrub-sapling habitat rich in fruits and insects important to migrating birds (Noss 1991; DeGraaf et al. 2006). Small-whorled pogonia, a federally threatened species also inhabits mature forests within the CFA. This species occurs in very few locations in the watershed and tends to occupy persistent open canopy sites that have soils with a pan layer and slopes with 11 to 17 percent gradient. On-going research in the northern portion of the species range is obtaining a better understanding of the habitat management techniques required to maintain viable populations (USFWS 2008).

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater than dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the sharp-shinned hawk and as roosting sites for bats such as federally listed northern long-eared and Indiana bats. Emergent white pines—tall, large-diameter trees that extend above the canopy—provide special habitats that, when near open bodies of water, are utilized by bald eagles and osprey. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, barred owls, and woodpeckers, like the northern flicker.

Small-whorled pogonia occurs in very few locations in the watershed. This plant inhabits upland sites in maturing stands of deciduous or mixed deciduous and coniferous forests with sparseto-moderate ground cover (due to nutrient poor soils), a relatively open understory, and proximity to persistent openings in the forest canopy, such as logging roads and streams. Permanent protection through land acquisition and conservation easements, consistent monitoring of known populations and a better understanding of habitat management techniques required to maintain viable populations are some of the criteria needed to delist the species (USFWS 2008).

Canada lynx, a federally threatened species, have been documented within the spruce-fir forests of northeastern Vermont and New Hampshire. Lynx were confirmed breeding within the Nulhegan Basin CFA in the winters of 2012 and 2013. Conservation efforts for this species will be done at the landscape scale, since no single landowner is likely to support enough habitat for this species. Additional information is necessary to evaluate the importance of the Connecticut River watershed for Canada lynx and to determine what measures are needed to ensure their persistence within northern Vermont and New Hampshire. We will continue to monitor Canada lynx populations in the Nulhegan Basin CFA, and work with partners to develop a regional lynx management plan.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan (HMP).

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure.

- Work with partners and adjacent landowners to identify areas appropriate for New England cottontail management. Plan to manage approximately 100 acres of shrubland habitat for New England cottontail in the CFA. This approximation of the amount and distribution of acreage over the next 15 years assumes we would have a large enough land base to manage. Our target acreage may also be refined once site conditions are verified and a HMP is completed.

- Work with partners and the USFWS New England Field Office to develop a lynx management plan for northern Vermont and New Hampshire, and evaluate the importance and role of habitats in the Quonatuck CFA to lynx populations in the southern portion of their range.

- Work with partners, including the states in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:

Within 5 years of land acquisition and CCP approval:

- Map vernal pools and seeps.

- Conduct forest and wildlife inventories including bat inventories and migratory and breeding landbird surveys.

- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1b. (Hardwood Swamp)

Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrants, as well as wintering habitat for rusty blackbirds.

Rationale:

Occurrences of hardwood swamps within the Quonatuck Conservation Focus Area (CFA) represent a number of natural communities. Historically they have undergone significant alteration, and have great potential for restoration. Acidic hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Eastern hemlock is often the dominant overstory species, and the organic substrate supports an important sphagnum (moss) layer.

Hardwood swamp occurrences within the Quonatuck CFA with more alkaline soils are often found along riparian and floodplain areas in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the water table drives complexes of forest upland and wetland species including pin oak, red maple, swamp white oak, sweetgum, and blackgum.

These two systems do share a common disturbance history; agricultural practices, development pressures, and selective logging have largely removed these habitats from the landscape, or greatly simplified their historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats. Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture

often eliminated softwood species. Our conservation efforts within the Quonatuck will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in a landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA may also provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the four state's wildlife agencies in support of their respective state wildlife action plan, to ensure management on Service lands complements adjacent land management objectives.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure, species composition, and/or ecological function

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve forest structure, species composition, and/or ecological function.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including surveys for rusty blackbirds during the migration and wintering periods.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, improve landscape connectivity to aid in climate change adaptation and provide habitat for migrating landbirds, wintering rusty blackbirds, breeding wood turtles and migrating, breeding, and wintering waterfowl.

Rationale:
Shrub swamps and floodplain forests are often found within the floodplain of rivers and streams. Though, shrub swamps also occur in isolated pockets within poorly drained areas and small seepage zones that are not part of a floodplain system (Gawler 2008). Many shrub-dominated swamp communities are maintained through flooding, and will likely persist for centuries. Floodplain forests occur within the floodplains of major river systems,

including the Connecticut River and many of its tributaries. These forests were a common occurrence until the middle of the 1800s, when floodplain communities were converted to agricultural use or urban areas. Floodplains are still valuable for agriculture today, and only fragments of floodplain forest remain within the watershed (Marks et al. 2011, Thompson and Sorenson 2000).

Shrub swamp and floodplain forest communities provide important habitat for migratory landbirds. A study of spring stopover habitat use by neotropical migrant birds within the Connecticut River Valley (*http://www.science.smith.edu/stopoverbirds/index.html*; accessed August 2013) conducted by Smith College through funding by the Service provides indications of the importance of the Connecticut River watershed to migrating birds. During a 3-year study (1996 to 1998), observers conducted 8,640 point count surveys and counted a total of 102,259 birds. The results demonstrated that spring migrant birds using the Eastern Flyway reach the southern portions of the Connecticut River watershed in large numbers, then disperse throughout the watershed and beyond as they continue north. Almost half (47%) of the birds counted within the defined count circles were at sites along the main stem of the Connecticut River. This trend was even more pronounced along the Connecticut and Massachusetts portions of the river and during the early periods of spring migration. Forested wetlands and shrub swamps are likely to be particularly valuable habitats along the main stem of the river because they provide more food and protection earlier in the spring migratory period due to warmer air and water temperatures and earlier tree leaf-out. Overall density of birds observed decreased by about half from south to north, as birds dispersed away from the main stem of the river as they moved north. The mouth and lower main stem of the Connecticut River may serve as a landscape feature used by many Eastern Flyway migrants to orient north after reaching the southern New England coast. The results of this study suggest that habitat protection within the Connecticut River watershed will have significant benefits for supporting neotropical migrants during the spring migratory period, especially forest and shrub wetlands along the main stem of the river.

This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Wood turtle, petitioned for federal protection in 2012, uses aquatic and adjacent terrestrial habitats within the Connecticut River watershed. This species is thought to be experiencing population declines exceeding 50% over the past 100 years. Populations are susceptible to factors that kill adult females due to their reproductive history, and the fact that wood turtles live primarily in and around river habitats which are often heavily impacted by human development. Habitat degradation, fragmentation and destruction are the main causes for population declines (van Dijk and Harding, J. 2016).

The shrub swamp and floodplain forest communities along the Connecticut River also provide stopover and breeding habitat for migrating and breeding waterfowl. The Connecticut River is a waterfowl focus area for New Hampshire and Vermont under the Atlantic Coast Joint Venture, highlighting the importance of the river habitats to breeding and migrating waterfowl (ACJV 2005, NHFG 2006). Species such as Canada geese, teal, mergansers, American black ducks, mallards, wood duck, and some sea ducks use the river corridor during spring and fall migration. The river provides prime breeding habitat for American black duck, wood duck, mallard, common merganser, and Canada geese. The lower Connecticut River supports waterfowl year-round with some of the highest and most significant concentrations of American black duck, a priority refuge resource of concern species, in the Northeastern United States (Dreyer and Caplis 2001).

Floodplains are not only important to species of conservation concern, but also to provide resilience to climate change. Storms are predicted to become more frequent and capable of producing more coastal and inland flooding. These storms are, and can continue to, negatively impact habitats and human infrastructure. Intact and connected floodplain habitats will slow down and contain floodwaters decreasing damage to watershed ecosystems and human infrastructure. It is critical that these habitats are protected and restored throughout the watershed.

Due to our unfamiliarity with habitat conditions in the CFA, management of these wetland communities will first require a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA. Baseline information on the condition of these wetlands at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Work with partners to restore degraded habitats, particularly floodplain forests.
- Work with partners, including the four state's wildlife agencies in support of their state wildlife action. plans, to ensure management on Service lands complement adjacent land management objectives.
- Control invasive plant species following best management practices. Invasive plant priorities include:
  - ✓ Removing invasive Oriental bittersweet using a combination of pulling smaller plants, cutting larger stems, and treating with herbicides to protect valuable canopy trees and young floodplain forest trees.
  - ✓ Removing black locust using herbicides following best management practices (*http://mnfi.anr.msu.edu/invasive-species/BlackLocustBCP.pdf*) to protect floodplain forest.
  - ✓ Control Amur corktree and other new, small infestations of invasive plants able to withstand flooding.
- Work with local Conservation Commissions on preferred herbicide use measures and ensure our invasive plant control complies with state wetlands protection acts.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including waterfowl surveys, migrating landbird surveys and surveys for rusty blackbirds for winter use.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marsh communities to support natural and rare ecological communities, and provide breeding, wintering, and stopover habitat for waterfowl.

Rationale:
Freshwater marshes along the Connecticut River are often part of the floodplain community, though they also occur in isolated pockets within poorly drained areas and small seepage zones outside the floodplain system. These habitats provide important stopover and breeding habitat for waterfowl and waterbirds. The Connecticut River is a waterfowl focus area for New Hampshire and Vermont under the Atlantic Coast Joint Venture, highlighting the importance of the river habitats to breeding and migrating waterfowl (ACJV 2005, NHFG 2006). Species such as Canada geese, teal, mergansers, American black ducks, mallards, wood duck, and some sea ducks use the river corridor during spring and fall migration. The river provides prime breeding habitat for American black duck, wood duck, mallard, common merganser, and Canada geese. Freshwater marshes provide calorie-rich aquatic and emergent vegetation, and invertebrates for these waterfowl species. Rails, bitterns, egrets, and herons also use freshwater marsh habitats for breeding and stopover foraging opportunities. Shorebirds will use tidal mudflats of freshwater tidal wetlands for foraging in the southern portion of the watershed.

The northeastern bulrush, a wetland plant, occurs within various beaver wetlands in the CFA. This species is federally listed, and has adapted to seasonal water fluctuations. Habitat alterations that change the hydrology of a wetland to be consistently wet or dry may have negative consequences for this species. Biologists are currently monitoring known populations, but more information is needed on the habitat requirements, reproductive strategy, and genetic variability (USFWS 2006).

The 1993 Recovery Plan for the species called for protection measures such as land acquisition and conservation easements (USFWS 1993). The 5-year review echoed these recommendations, stating that the highest priority actions are to resurveying populations that have not recently been surveyed, securing protection on public and private lands, conducting periodic surveys of populations to determine trends and threats, and implementing management tools to reduce threats and monitor effectiveness of these actions (USFWS 2008).

Freshwater marsh communities are identified as having high ecological and functional importance within the state wildlife action plans. Also within these plans, a common concern exists for the health and proliferation of these habitats. Development, invasive species, contamination, altered hydrology, dredging, and sedimentation are a few of the threats that are damaging these ecosystems.

Due to our unfamiliarity with habitat conditions in the CFA, management of these wetland communities will first require a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA. Baseline information on the condition of these wetlands at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Use state best management practices within or adjacent to active agricultural fields that are located along the perimeter of marsh habitats.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife use of existing wetlands.
- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Where appropriate, restore pasture, hay, and grasslands to floodplain forest communities and provide a forested buffer along the Connecticut River. Also, if and where appropriate, maintain a contiguous block of grassland habitat for breeding and migrating grassland bird species and pollinators.

Rationale:
These habitat types are primarily the result of agricultural production activities. Agricultural lands occupy roughly 8.5 to 12 percent of the watershed's landbase, of which one-half to one-third, approximately 229,000 acres, is prime agricultural land. Most of the quality agricultural lands are in the broad Connecticut River Valley (Clay et al. 2006) and often within the floodplain of the Connecticut River.

Floodplain forests occur along medium to large rivers, and include a matrix of upland and wetland habitats. Common habitats in floodplains are silver maple stands, herbaceous sloughs, and shrub wetlands. Most areas are underwater each spring; micro-topography determines how long the various habitats are inundated. Associated trees include red maple and American hornbeam and on terraces or in more calcium rich areas, sugar maple or red oak may be locally prominent, with yellow birch and ash, black willow is characteristic of the levees adjacent to the channel. Common shrubs include silky dogwood and viburnum. The herb layer in the forested portions often features abundant spring ephemerals, giving way to a fern-dominated understory in many areas by mid-summer (Gawler 2008). Within the Connecticut River watershed, agricultural practices and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions and soil compaction remain as threats.

Our conservation efforts within the Quonatuck CFA will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Intact floodplain forests in the Quonatuck CFA will provide high-quality habitat for neotropical migratory birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Species such as wood thrush, veery, and black-throated green warbler with a preference for forest habitats during migration will benefit (McCann et al. 1993). Restoration of floodplain forest communities will restore forest connectivity, providing travel corridors for wildlife. Increased water quality will also result as erosion and siltation will decrease, and a restored canopy will provide shade for aquatic species.

During European settlement millions of hectares of forests were cleared for agriculture in the eastern U.S. creating habitat for grassland dependent birds. As agricultural activities declined, open areas dominated by herbaceous vegetation began to convert back to forests, causing a drastic decline in grassland species in the region. Prior to European settlement, Native Americans also cleared and maintain some amount of grassland habitat. Naturally occurring grassland ecosystems were not uncommon in the eastern U.S., but, were often found closer to the coast rather than inland (Brennan et al. 2005). These grassland ecosystems have since been impacted by development and fragmentation.

The major river valleys and coastal areas likely contained most of the natural grasslands (Dettmers and Rosenberg 2000). Today, little historic natural grassland remains. Potentially suitable lands, such as pastures and hayfields, are increasingly being converted into residential developments. The highest quality habitats for grassland birds in the Watershed typically are in conservation areas or airports which delay mowing until the middle of July to allow the ground-nesting birds to fledge their young.

Some level of grassland conservation and, where appropriate, restoration, is warranted based on the historic evidence and the desirability of retaining grassland species (often state-listed) in each state. The Partners in Flight plan for the Southern New England Physiographic region set a broad level goal of protecting 25,000 to 38,000 acres of grassland, to produce 250 breeding pairs of upland sandpipers, 800 pairs of grasshopper sparrows, and 15,000 pairs of bobolinks. In Connecticut, Connecticut Audubon recommended a 5,000-acre network of natural grasslands in patches at least 500 acres in size, 3,500 acre late harvest working hayfields (greater than 25 acre blocks), and giving priority to currently existing grasslands (Comins et al. 2005).

Grassland habitat is also important for pollinators, such as the yellow banded bumble bee, regal fritillary and monarch butterfly. These species, as well as many other pollinator populations, have been declining due to habitat loss, pesticide use, competition with non-native species and disease. The yellow banded bumble bee, fritillary and monarch butterfly have experienced drastic declines, and the Service has been petitioned to list them under the Endangered Species Act.

Due to our unfamiliarity with the habitat conditions in the CFA, a comprehensive, multi-scale habitat and wildlife inventory will be necessary to implement refuge strategies. This inventory will need to encompass all habitats within the CFA and associated landscape. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Assess the condition of pasture, hay and grassland habitats, as well as the overall size and location in the CFA, and proximity to other forest openings, to inform more detailed management strategies in an HMP.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water and River Shore)
In collaboration with partners, identify and implement habitat restoration opportunities within the Quonatuck CFA and Connecticut River to benefit priority refuge resources of concern including American shad, shortnose sturgeon, alewife, blueback herring, Atlantic salmon, dwarf wedgemussel, wood turtle, Jessup's milk-vetch and Puritan tiger beetles.

Rationale:
The Quonatuck CFA provides habitat for a diversity of aquatic and river shoreline species. The Connecticut River and associated tributaries provides migration and feeding habitat for American shad, shortnose sturgeon, American eel, blueback herring, Atlantic sturgeon and Atlantic salmon. The main stem shoreline within the CFA supports populations of the federally listed Puritan tiger beetles, which require sandy beaches, as well as three populations of Jessup's milk-vetch, which require river outcrops and ledges. Dwarf wedge mussel, another federally listed species, also occurs in the mainstem and tributaries of the Quonatuck CFA.

Shortnose sturgeon and Atlantic sturgeon, federally listed species, use habitats in the lower portion of the Connecticut River. Sections of the main stem in Massachusetts are important migrating habitat for shortnose sturgeon, while certain sections in Connecticut are critical spawning and overwintering habitat for this species.

Juvenile Atlantic sturgeon were recently documented in the lower portion of the Connecticut River (S. Gephard, CTDEEP, personal communication 2015). This Federal endangered species and a species of greatest conservation need in Connecticut, were once considered extirpated in the Connecticut River, as reproduction no longer occurred in the main stem (Sprankle personal communication 2014). The documentation of juveniles provides a higher probability that there are opportunities to recover this species in the Connecticut River.

Atlantic salmon use habitats in the lower portion of the Connecticut River, while blueback herring, American shad and American eel use the mainstem and tributaries. Another species of conservation concern worth mentioning is sea lamprey. Sea lamprey enters the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

Wood turtle may also use the clear, hard-bottom streams and rivers, as well as adjacent forested habitat within this CFA. This species was petitioned for federal protection in 2012. They are thought to be experiencing population declines exceeding 50% over the past 100 years. Populations live primarily in and around river habitats which are often heavily impacted by human development. Habitat degradation, fragmentation and destruction are the main causes for population declines (van Dijk and Harding, J. 2016).

The federally threatened Puritan tiger beetle occur in two populations along the Connecticut River—one in Massachusetts owned by the City of Northampton and Massachusetts Division of Fisheries and Wildlife and another partially occurring on the refuge's Dead Man's Swamp Unit in Connecticut. The Recovery Plan for this species was issued in 1993 (USFWS 1993b). The recovery plan called for a minimum of three metapopulations established or maintained along the species historic range along the Connecticut River. The 2007 5-year review recommended that a high priority be given to identifying private landowners that would be willing to enter into conservation easements for the protection and management of Connecticut River shoreline habitat supporting beetles (USFWS 2007).

The endangered Jesup's milk-vetch is restricted to three locations within rocky outcrops and ledges of the Connecticut River in central New Hampshire and Vermont. Jesup's milk-vetch requires open areas with very little competition from other plants to germinate. This habitat is provided by frequent ice scours and spring flooding. Native and non-native invasive plants are altering the habitat suitability at all three sites. Intensive invasive species management efforts have been on-going since 1998 and have kept invasive populations at low levels, but long-term management strategies to control or eliminate invasive plants needs to be developed and implemented. Changes in weather patterns including unusual flooding events, lack of ice-scour and drought in recent years may impact Jesup's milk-vetch reproduction and ability to compete with other species for available habitat. Long-term investigations on impacts from these changes are needed to determine what impacts weather events are having on populations.

Introduction efforts of Jesup's milkvetch to other locations on the Connecticut River mainstem have occurred intermittently since 2009. One site has proven successful with over 35% survival of planted seedlings the first year, and over 45% of those seedlings producing fruit the second year (Popp personal communication 2016).

Recovery of this species will be a long-term commitment. Efforts include annual monitoring of established and introduced populations, management of invasive plants, continued introduction of new sub-populations, and conservation of all sites.

This CFA will contribute to the conservation of the federally endangered dwarf wedgemussel. This species requires stable bank conditions and high water quality (U.S. Fish and Wildlife Service 1993, Nedeau et al. 2000). This mussel is threatened by habitat loss, fragmentation and altered river processes (Nedeau 2009).

Restoring and maintaining the ecological integrity of upland and wetland habitats of the CFA will have positive impacts on water quality of the Connecticut River, and other aquatic systems in the CFA. Baseline information on the condition of the water resources, and associated upland and wetland habitats in the CFA will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to maintain open channels from the Connecticut River to open water coves.
- Work with adjacent landowners to eliminate barriers to aquatic species passage.
- Work with partners to develop and begin implementation of actions to conserve the existing Puritan tiger beetle metapopulation that includes the Deadmans Swamp unit. This should include identifying potentially suitable sandy beach habitat, land protection options for suitable habitats, actions that will contribute to recovery, and management of Service lands to complement tiger beetle recovery efforts.
- Work with partners to manage beach habitats to benefit Puritan tiger beetles which includes hand-pulling or herbicide application to encroaching vegetation in puritan tiger beetle larval habitat.
- Continue to support puritan tiger beetle research opportunities.
- Work with partners to monitor puritan tiger beetle populations.
- Work with partners to educate the general public about recreational use impacts on puritan tiger beetle populations using outreach, visitor contact, restricted access and other tools, as warranted.
- Partner with CT DEEP and other partners to establish two additional puritan tiger beetle meta-populations as called for in the Recovery Plan.
- Work with partners to secure existing Jessup's milk-vetch populations. Actions may include herbicide and mechanical treatment of encroaching vegetation and monitoring species status using a standardized approach.
- Work with partners to establish additional Jessup's milk-vetch populations on public and conserved lands along the Connecticut River mainstem.
- Work with partners to develop a long-term management plan for Jesup's milk-vetch.
- Support long-term research for Jesup's milk-vetch including investigations on impacts from climate change and genetic studies.
- Work with partners to continue monitoring dwarf wedge mussel populations, and educate adjacent landowners on land use impacts to the species.
- Work with partners to develop comprehensive resource protection, monitoring and management plans for dwarf wedgemussels and puritan tiger beetles within the CFA boundary.
- *Within 10 years of land acquisition and CCP approval:*
- Work with partners to protect and increase "hard bottom" (e.g., gravel, cobble, or bedrock) for spawning aquatic species.
- Work with partners to reduce combined sewer overflow.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Sub-objective 1.4a. (Dunes and Maritime Grasslands)
Protect and manage dunes and maritime grassland habitats to support species of conservation concern and natural and rare ecological communities.

Rationale:
These habitats include the Atlantic coastal plain northern dune and maritime grassland, and heathland and grassland community types. These systems are restricted to the coast of Connecticut, and are therefore rare in the watershed. Coastal dunes and grasslands are generally small, in good to fair condition, and often located

along Long Island Sound adjacent to low energy beaches (CT 2005). The grasses and shrubs that dominate are influenced by the maritime environment, including frequent salt spray, saltwater overwash, and sand movement (Gawler 2008).

The coastal plain heathland and grassland communities are related to dune grasslands but occur on sandplains, not dunes. These communities may occur as heathlands, grasslands, or support a patchwork of grass and shrub vegetation. Sandplain grasslands are one of the most impacted terrestrial habitats in Connecticut, and the condition of the habitat is considered poor (CT 2005). Coastal plain heathland and grassland community vegetation is maintained by fire, though in the absence of disturbance (fire, grazing, mowing), coverage by pitch pine and scrub oak can increase, creating vegetation similar to a pitch pine—scrub oak barren; or in some cases, a tall-shrub community can develop in the absence of fire (Gawler 2008).

These communities are fragile habitats that support priority species in need of protection from human development and disturbances. They protect salt marsh from storms and provide nesting and feeding habitat for piping plovers, roseate terns and American oystercatchers. The most challenging issues facing dune habitat are recreational activities, oil spills, and rising sea level resulting from climate change (CT 2005).

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including state wildlife agencies, in support of state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives
- Work with partners to monitor and protect breeding populations of piping plover, as well as populations of migrating roseate terns.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.4b. (Biological Integrity, Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the watershed.

Rationale:
Refuge managers are required to manage for the "biological integrity, diversity, and environmental health" (BIDEH) of the Refuge System pursuant to the National Wildlife Refuge System Improvement Act of 1997. This mandate is a cornerstone of Refuge System philosophy and management. The framework for fulfilling the mandate is provided in Refuge System Policy 601 FW 3, which calls for the maintenance of "historic conditions," which are defined in policy as "composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human related changes to the landscape." In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010).

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987; Hunter 1991; Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and slow moving streams and pools in wetland ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer & Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Quonatuck CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger upland and wetland matrix, and providing additional structural and species diversity to the matrix. Rocky shorelines along large river systems, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or a nutrient rich site for benthic organisms. One could make the case that these rocky shorelines are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including state wildlife agencies, in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Sub-objective 1.5a. (Salt Marsh)
Protect and manage salt marsh habitats to support species of conservation concern, and natural and rare ecological communities.

Rationale:
The name Connecticut is the French corruption of the Algonquin word "quinetucket" meaning *long tidal river*. The second largest group of wetlands in the Watershed is estuarine wetlands or tidal wetlands which are located in the lower part of the main stem of the Connecticut River. Estuarine wetlands are influenced by both tidal and freshwater flows. The lower part of the Connecticut River is considered the most pristine large–river tidal marsh system in the Northeast (USFWS 1994). The wetlands at the mouth of the Connecticut River are intertidal marshes vegetated by grasses such as smooth cordgrass, saltmeadow cordgrass or hay grass, salt or spike grass, saltmeadow rush or black grass, and other salt–tolerant plants. Salt marshes are among the most productive ecosystems in the world.

Further upstream, the Connecticut River has extensive, high-quality freshwater and brackish tidal wetland systems which provide habitat for several federally listed species, species at risk and globally rare species, including wintering bald eagles, shortnose sturgeon, and Puritan tiger beetles. This area also provides significant

American black duck habitat for breeding, wintering, and migration. It serves as an important movement corridor for migratory birds, especially waterfowl, rails, many species of neotropical migrants, and raptors. Within this group of wetlands, wild rice marshes are considered rare and valuable and function as significant resting and feeding areas for waterfowl, shorebirds, and especially the sora rail.

The lower Connecticut River tidal wetlands complex has been designated a "Wetland of International Importance" by the multi-national Convention on Wetlands of International Importance (aka Ramsar Convention). The Ramsar Project area contains 20,570 acres and consists of 20 discrete major wetland complexes (USFWS 1994). The Ramsar designation is used for wetland complexes that have international significance in terms of ecology, botany, zoology, limnology, or hydrology. The lower Connecticut River tidal wetlands complex is considered the best example of this type in the northeastern United States.

Tidal wetlands provide foraging habitat for a variety of shorebirds, including willet, various species of sandpipers, ruddy turnstone, red knot, and whimbrel. These wetlands also support migrating and wintering waterfowl, various marsh birds, sparrows, bald eagles, and osprey. Its tidal marshes and mudflats support significant concentrations of waterfowl and shorebirds, as well as nesting habitat for global significant species such as the salt marsh sharp-tailed sparrow (Atlantic Coast Joint Venture 2005). This habitat is also important as nursery areas for a variety of aquatic species.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including state wildlife agencies in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.
- Identify and prioritize wetland restoration or enhancement projects that benefit species of conservation concern.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories particularly to determine the status, abundance, and distribution of priority resources of concern such as salt marsh sharp-tailed sparrows, and American black duck.
- Map natural communities; protect rare or exemplary examples.
- Identify and map estuarine habitats, particularly spawning and nursery habitats.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to: develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively towards solutions; model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Quonatuck Division as an outdoor classroom.

Rationale:
Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to "provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access."

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Quonatuck Division as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Quonatuck Division as an outdoor classroom.

Rationale:
Because this division will be unstaffed, the majority of environmental education opportunities on this division will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Quonatuck Division as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Quonatuck Division. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
Interpretation is an important tool that can be used to spread the refuge message to private residents and visitors to the refuge. With an ADA-compliant trail planned for the site, the Quonatuck Division is well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge, and the Quonatuck Division's habitats, wildlife, and cultural resources.

Management Strategies:
Within 5 years of acquiring sufficient land:

- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Quonatuck Division.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, print and social media, signs, and exhibits) when creating programming for natural and cultural resource interpretation.
- Make Certified Interpretive Guide (NAI) training available once every other year for refuge personnel, Friends Group members and the general public, with priority given to refuge affiliates.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Quonatuck Division.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge Web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures (e.g., general brochure and bird checklist) that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self-guided interpretive messages and use state-of-the-art, as well as traditional media (e.g., pamphlets, signs, etc.).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Quonatuck Division would be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Quonatuck Division would be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
Hunting is one of the six priority, wildlife-dependent recreational uses for the Refuge System. Hunting is generally allowed on national wildlife refuges, as long as it is found to be a compatible use. We would plan to open portions of the Quonatuck Division to hunting, assuming it is found compatible and we acquire sufficient land to support hunting. Allowing hunting opportunities at this unit conforms to historic use on the nearby state wildlife management areas. Allowing hunters to use public lands helps ensure this wildlife-dependent recreational activity continues and contribute to the states' population management objectives.

Management Strategies:
Within 1 year of acquiring sufficient land to support hunting seasons:

- Consult with state wildlife agencies to evaluate the suitability of new acquisitions to support a safe, manageable hunt programs.
- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal division open hours, as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with state wildlife agencies to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with state wildlife agencies to evaluate the effectiveness and success of a refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes to access the division and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, Web site pages, media releases, etc. to increase interest in hunting at the division.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce hunt brochure(s) that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at Quonatuck Division kiosks, through a friends group, and in local businesses.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with state wildlife agencies to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Quonatuck Division after completing all administrative procedures to officially open refuge lands to fishing, based on state regulations and division-specific regulations, if necessary.

Rationale:
Fishing is one of the six priority, wildlife-dependent recreational uses for the Refuge System. The principal fishing resources on this CFA are the Connecticut River and its major tributaries. Our management would focus on providing river access to anglers, where compatible fishing opportunities exist.

Management Strategies:
Within 1 year of acquiring land with fishable waters:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.

Within 5 years of acquiring land with fishable waters:

- Work with state wildlife agencies to inventory and assess fish populations on the division.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired and fishing is determined to be compatible, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
Within 1 year of acquiring land with fishable waters:
- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at the division kiosk, through friends groups, and in local businesses.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity. Opening acquired land in this new division to wildlife observation and photography will provide visitors a chance to see and photography a variety of wildlife species in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
Within 1 year of acquiring land:
- Allow public access from 30 minutes before sunrise to 30 minutes after sunset for wildlife observation and photography.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:
- Develop a public access strategy and required planning (e.g., NEPA compliance and compatibility determinations) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:
- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the division.

Rationale:
The entire division would be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 1 year of acquiring land:
- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and environmental organizations to offer wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the division for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, boat access, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge visitor services plan.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Develop compatible opportunities on Quonatuck Division that promote state and watershed-wide initiatives that facilitate wildlife observation and photography, such as the Connecticut River Birding Trail and state roadside wildlife viewing areas, and which raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
Watershed-wide recreational trails and initiatives give individuals opportunities to view and photography wildlife throughout the Connecticut River watershed. Examples include the Connecticut River Birding Trail, the Connecticut River Byway, the Connecticut River Paddler's Trail, and the newly designated Connecticut River Watershed Blueway. Where appropriate, we will work with these partners to promote, and distribute information about these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- Work with partners to support and promote watershed-based wildlife observation and photography opportunities, such as the Connecticut River Birding Trail.
- Make guides and published materials supporting the Connecticut River Byway and the Connecticut River Watershed Blueway available at the visitor contact station.

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Quonatuck Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River Birding Trail, the Connecticut River Byway, the Connecticut River Paddler's Trail, and the newly designated Connecticut River Watershed Blueway. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- Work with partners to support and promote regional water-based trail initiatives.
- Work with public and private partners to determine whether and what roles this division might contribute to a Connecticut River waterway route.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Quonatuck Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division without detrimentally impacting the wildlife resource.

Management Strategies:
Within 1 year of acquiring land:

- Allow hiking, snowshoeing, and cross-country skiing in designated areas.
- Allow petwalking; pets must be on a leash no longer than 6 feet long and must be under the control of their owners/handlers to avoid posing a threat to other visitors, staff, or wildlife.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.
- Consider providing boat access (e.g., trails to water, boat launches for motorized boats and canoes and kayaks).